CLAIMS

1. An image processing apparatus, comprising:

a distribution data generation means for generating distribution data indicating a distribution of pixel data for a plurality of pixel data indicating pre-regulated pixel values in the first range and composing first image data obtained by taking a picture of a subject;

a specifying means for specifying a second range to be binarized in the first range based on the distribution data generated by the distribution data generation means;

a mapping means for mapping pixel data in the second range specified by the specifying means among a plurality of pixel data to the first range, and generates second image data composed of the mapped pixel data; and

a binarization means for binarizing the second image data generated by the mapping means based on a threshold value regulated in the first range to generate a third image data.

2. An image processing apparatus as set forth in claim 1, wherein said distribution data generation means generates a distribution data indicating the number of pixel data having pixel values for the respective pixel

values in the first range;

and said specifying means specifies as the second range a range having pixel values which is maximum pixel value or less among predetermined number of the pixel data within the first range.

3. An image processing apparatus as set forth in claim 1, further comprising a noise removing filter means for generating a fourth image data by performing edge enhancement processing after noise removing processing on the second image data generated by the mapping means,

wherein the binarization means binaries the fourth image data generated by the noise removing filter means based on a threshold value regulated in the first range to generate the third image data.

4. An image processing apparatus as set forth in claim 3, wherein said noise removing filter means generates the fourth image data by performing Gaussian Laplacian filter for the edge enhancement processing ,after performing Gaussian filter for the noise removing processing on the second image data generated by the mapping means.

5. An image processing apparatus as set forth in claim 4, wherein said noise removing filter means generates the fourth image data by performing any one processing among Gaussian filter, maximum value filter,

minimum value filter, two-dimensional adaptive noise removing filter, proximity filter, averaging filter, Gaussian low-pass filter, two-dimensional Laplacian proximity filter, or Gaussian Laplacian filter for noise removing processing based on the second image data generated by the mapping means.

6. An image processing apparatus as set forth in claim 1, further comprising a filter processing means for generating a fifth image data by performing filter processing to leave a linear pattern based on the second image data generated by the mapping means,

wherein the binarization means binaries the fifth image data generated by the filter processing means based on a threshold value regulated in the first range to generate the third image data.

7. An image processing apparatus as set forth in claim 6, wherein said filter processing means specifies the fifth image data of low frequency components compared with the threshold value to leave a linear pattern by frequency components in the two-dimensional Fourier space obtained by performing two-dimensional Fourier transform processing on the second image data generated by the mapping means.

8. An image processing apparatus, comprising:

a first processing means for indicating a

pixel value and using as a pixel data the minimum pixel data in the first region around the pixel data, for each of a plurality of pixel data composing the first image data obtained by a taking a picture of a subject; and

a second processing means for generating a second image data by using as the pixel data the maximum pixel data among pixel data in the second region larger than the first region around the pixel data for each of image data by the first processing means.

9. An image processing apparatus as set forth in claim 8, further comprising a third processing means for generating a third image data by using as a pixel data the minimum pixel data in the second region around the pixel data, for each of pixel data composing the second image data generated by the second processing means.

10. An image processing apparatus as set forth in claim 8, further comprising a fourth processing means for using as a pixel data the maximum pixel data in the among pixel data in the first region around the pixel data, for each of pixel data generated by the first processing means,

wherein the second processing means generates the second image data by using as a pixel data the maximum pixel data among pixel data in the second region being larger than the first region around the pixel data

by the forth processing means.

11. An image processing method, including:

a first step for generating distribution data indicating a distribution of pixel data for a plurality of pixel data indicating pre-regulated pixel values in the first range and composing first image data obtained by taking a picture of a subject;

a second step for specifying a second range to be binarized in the first range based on the distribution data generated by the first step;

a third step for mapping pixel data in the second range specified by the second step among a plurality of pixel data to the first range, and generates second image data composed of the mapped pixel data; and

a forth step for binarizing the second image data generated by the fourth step based on a threshold value regulated in the first range to generate a third image data.

12. An image processing method as set fourth in claim 11, wherein said first step generates the distribution data indicating the number of pixel data having pixel values for respective pixel values in the first range;

and said second step specifies as the second range a range having pixel data which is maximum pixel value or

less among a predetermined number of the pixel data within the first range as the second range to be binarized.

13. An image processing method as set forth in claim 12, further comprising a fifth step of generating forth image data by performing edge enhancement processing after performing noise removing processing based on the second image data generated by the third step,

wherein the fourth step generated by the fifth step on a threshold value regulated in the first range to generate the fourth image data.

14. An image processing method as set forth in claim 15, wherein said fifth step generates the fourth image data by performing Gaussian Laplacian filter for the edge enhancement processing after performing Gaussian filter for the noise removing processing on the second image data generated by the third step.

15. An image processing method as set forth in claim 13, wherein said fifth step generates the fourth image data by performing any processing among a plurality of different noise removing processing based on the second image data generated by the third step.

16. An image processing method as set forth in claim 15, wherein said fifth step generates the fourth

image data by performing any one processing among Gaussian filter, maximum value filter, minimum value filter, two-dimensional adaptive noise removing filter, proximity filter, averaging filter, Gaussian low-pass filter, two-dimensional Laplacian proximity filter, or Gaussian Laplacian filter for noise removing processing on the second image data generated by the third step.

17. An image processing method as set forth in claim 11, further comprising a sixth step for generates the fifth image data by performing filter processing to leave a linear pattern based on the second image data generated by the third step,

wherein the forth step binaries the fifth image data generated by the sixth step based on a threshold value regulated in the first rage to generate the third image data.

18. An image processing method as set forth in claim 17, wherein said sixth step specifies the fifth image data of low frequency components compared with the threshold value to leave a linear pattern by frequency components in the two-dimensional Fourier space obtained by performing two-dimensional Fourier transform processing on the second image data generated by the third step, and

the forth step binaries the fifth image data

specified by the sixth step on a threshold value regulated in the first range to generate the third image.

19. An image processing method as forth in claim 18, wherein said sixth step specifies the sixth image data of low frequency components comparing with the threshold value larger than the threshold value by frequency components in the two-dimensional Fourier space obtained by performing two-dimensional Fourier transform processing on the image data generated by the third step.

20. An image processing method, including:

a first step for indicating a pixel value and using as a pixel data the minimum pixel data in the first region around the pixel data, for each of a plurality of pixel data composing the image data obtained by a taking a picture of a subject; and

a second step for generating a second image data by using as the pixel data the maximum pixel data among pixel data in the second region being larger than the first region around the pixel data for each of image data by the first step.

21. An image processing method as forth in claim 20, further comprising a third step for generating a third image data by using as a pixel data the minimum pixel data in the second region around the pixel data, for each of pixel data composing the second image data

generated by the second step.

22. An image processing method as forth in claim 20, further comprising a fourth step for using as a pixel data the maximum pixel data in the among pixel data in the first region around the pixel data, for each of pixel data generated by the first step,

wherein the second step generates the second image data by using as a pixel data the maximum pixel data among pixel data in the second region being larger than the first region around the pixel data by the forth step.

23. An image processing method as forth in claim 20, further comprising a fifth step for generates the fourth image data by performing filter processing for leaving a linear pattern based on the second image data generated by the second step.

24. An image processing method as forth in claim 23, wherein said fifth step processing means specifies low frequency components comparing with the threshold value to leave a linear pattern by frequency components in the two-dimensional Fourier space obtained by performing two-dimensional Fourier transform processing on the image data generated by the second step.

25. An image processing method as forth in claim 24, wherein said fifth step specifies the second image data of low frequency components comparing with the

threshold value larger than the threshold value by frequency components in the two-dimensional Fourier space obtained by performing two-dimensional Fourier transform processing on the image data generated by the second step.